IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Art Unit: 2164
Macready et al.	Examiner: To be assigned
Serial No. 09/729,692 Filed: December 6, 2000	Attorney Docket: 9392-040-999
For: Method and System for Discovery of Trades Between Parties	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

IN THE CLAIMS:

Please add new claims 3-141. A clean version of the entire set of pending claims (original claims 1-2 and new claims 3-141) follows:

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01 FC:102 160.00 CH
02 FC:103 2178.00 CH

7 Claims

What is claimed in the present invention is

1. A method for discovery of trades between one or more buyers and one or more sellers comprising the steps of:
   (a) expressing one or more terms of an ideal trade and one or more flexibilities by at least one of said buyers;
   (b) expressing one or more capabilities by at least one of said sellers; and
   (c) determining at least one optimal trade with respect to said one or more terms and said one or more flexibilities of said at least one buyer and said one or more capabilities of said at least one seller.

2. A method for discovery of trades between one or more buyers and one or more sellers as in 1, wherein said one or more terms comprise one or more members of the group consisting of continuous factors, discrete factors and range factors.

3. (New) A system for determining one or more trades between a buyer and one or more suppliers comprising:
   (a) one or more variables defining a space of negotiation;
   (b) a utility function of said one or more variables for expressing a utility of the one or more trades to the buyer over the space of negotiation comprising:
      i. an ideal trade to the buyer defined by one or more ideal values corresponding to said one or more variables; and
      ii. at least one flexibility in at least one of said variables expressing how the utility of the trade to the buyer varies in the space of negotiation for said ideal trade;
   (c) one or more capabilities for defining a subspace of the negotiations space wherein the one or more suppliers have an ability to trade; and
   (d) an optimizer determining at least one of the trades that is optimal with respect to said utility of the buyer subject to the capabilities of the one or more suppliers.

4. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 3 wherein said one or more variables comprise one or more of the following:
   (a) one or more continuous variables $\mathbf{x}$, one or more discrete variables $\varkappa$ and one or more range variables $\mathbf{r}$.

5. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 4 wherein each x_i of said one or more continuous variables $\mathbf{x}$ has an allowed range over which said each continuous variable x_i may vary $x_i \in X_i = [\underline{x}_i, \overline{x}_i]$, wherein $\underline{x}_i$ is a lower bound of said continuous variable x_i and $\overline{x}_i$ is an upper bound of said continuous variable x_i;

6. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 5 wherein each $\varkappa_i$ of said one or more discrete variables $\varkappa$ has a value from a domain

$\varkappa_i \in \mathcal{D}_i = [1, \cdots, d_i]$ where $d_i \geq 0$ is an integer giving the number of possible values that said discrete variable $\varkappa_i$ may assume.

7. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 6 wherein the space of negotiation comprises a tensor product $X_1 \otimes \cdots \otimes X_{n_c} \otimes \mathcal{D}_1 \otimes \cdots \otimes \mathcal{D}_{n_d}$.

wherein

n_c is the number of said continuous variables;

n_d is the number of said discrete variables;

X_i is said allowed range of said continuous variable x_i; and

D_i is said domain of said discrete variable $\varkappa_i$.

8. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 4 wherein said utility function $u((\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r}))$ comprises an expression of a distance function $d(\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r})$ that defines a distance from said ideal trade in the space of negotiation.

9. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 8 wherein said distance function comprises at least one of the following: a continuous distance, a discrete distance $Z(\boldsymbol{\varkappa})$, and a range distance R.

10. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 9 wherein said range distance depends on the value of at least one of said discrete variables $\varkappa$.

11. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 10 wherein said range distance is defined as:

$R(\mathbf{r}; \boldsymbol{\varkappa}) = \sum_{i=1}^{n_r} R_i(r_i; \boldsymbol{\varkappa})$

wherein:

$\mathbf{r}$ is an n_r vector of tables of preferred values of said one or more range variables, $r_i = (\underline{r}_i, \overline{r}_i)$;

n_r is the number of said range variables; and

$\overline{r}_i > \underline{r}_i$.

12. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 10 wherein said range distance is a distance $d(r_i, r_j)$ between said range variable $r_i = (\underline{r}_i, \overline{r}_i)$ of the buyer and said range variable $r_j = (\underline{r}_j, \overline{r}_j)$ of at least one of the suppliers.

13. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 12 wherein said distance between said buyer range variables and said supplier range variable $d(r_i, r_j)$ comprises an overlap between said buyer range variable and said supplier range variables, overlap (r_i, r_j).

14. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 13, wherein said overlap is defined as

$$\text{overlap}(r_i, r_j) = \int_{\mu_j - \sigma_j}^{\mu_j + \sigma_j} dx \, \mathcal{N}(x; r_i)\mathcal{N}(x; r_j)$$

where

$\mathcal{N}(x; r_j)$ is a Gaussian in x centered at $\mu_j = (\underline{r}_j + \overline{r}_j)/2$ with standard deviation $\sigma_j = \alpha(\overline{r}_j - \underline{r}_j)$;

$\mathcal{N}(x; r_i)$ is a Gaussian in x centered at $\mu_i = (\underline{r}_i + \overline{r}_i)/2$ with standard deviation $\sigma_i = \alpha(\overline{r}_i - \underline{r}_i)$; and

α is a tunable parameter.

15. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 14 wherein said range distance is defined as

$$R(r_i, r_j) = -\ln\left[\frac{\text{overlap}(r_i, r_j)}{\text{maxOverlap}}\right]$$

wherein

$$\text{maxOverlap} = \frac{\text{erf}\left[\frac{1}{\sqrt{2}}\right]}{\sqrt{2\pi(\sigma_i^2 + \sigma_j^2)}}$$

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16. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 9 wherein said continuous distance is quadratic and is determined by a positive semi definite n_c x n_c matrix $\mathbf{C}^{-1}$ wherein n_c is the number of said continuous variables.

17. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 16 wherein said continuous distance is defined as

$$\big(\mathbf{x} - \boldsymbol{\mu}(\varkappa)\big)^t \mathbf{C}^{-1}(\varkappa)\big(\mathbf{x} - \boldsymbol{\mu}(\varkappa)\big).$$

wherein

$\boldsymbol{\mu}$ is an n_c-vector of ideal values of said continuous variables that may depend on said discrete variable $\varkappa$.

18. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 9 wherein said continuous distance is a convex function.

19. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 9 wherein each of said discrete variables $\varkappa_i$ has a value from a domain D_i.

20. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 19 wherein said discrete distance $Z(\varkappa)$ maps a discrete space $\mathcal{D}_1 \otimes \cdots \otimes \mathcal{D}_{n_d}$ onto the positive real line $[0, \infty]$ wherein n_d is the number of said discrete variables.

21. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 20 wherein said discrete distance $Z(\boldsymbol{\varkappa})$ is defined as

$$Z(\boldsymbol{\varkappa}) = \sum_{i=1}^{n_d} \Big\{ Z_i(\varkappa_i) + \sum_{j=1(\neq i)}^{n_d} Z_{i,j}(\varkappa_i, \varkappa_j) \Big\}$$

wherein

each $Z_{i,j}$ is a table comprising $d_i d_j$ entries; and

$d_i d_j$ is the distance if said ith discrete variable has value $\varkappa_i$, conditional on said jth discrete variable having value x_j.

22. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 21 wherein values in said tables $Z_{i,j}$ are determined from one or more rankings by the buyer.

23. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 22 wherein said discrete distance Z is defined as $Z = -\ln[1 - Z']$.

wherein

Z' is normalized to lie between 0 and 1.

24. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 23 wherein said normalized distance Z' is a linear scaling.

25. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 23 wherein said normalized distance Z' is an exponential scaling.

26. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 23 wherein said normalized distance Z' is an algebraic scaling.

27. (New) A system for determining one or more trades between a buyer and one or more supplies as in claim 9 wherein said discrete distance $Z(\varkappa)$ is a function of one or more pairs of said discrete variables x_i, x_j.

28. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 8 wherein said distance is generated from a ranking of preferred values for said one or more variables by the buyer.

29. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 4 wherein said utility function $u((\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r}))$ expresses one or more tradeoffs among the one or more variables $\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r}$.

30. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 8 further comprising one or more scaling factors, Q_c, Q_d, Q_r to normalize contributions of said at least one continuous variable $\mathbf{x}$, said at least one discrete variable $\mathbf{x}$, and said at least one range variable $\mathbf{r}$ to said utility function $u((\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r}))$ for defining a baseline wherein the one or more variables contribute equally to said utility.

31. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 30 wherein said distance function with said normalized contribution is defined as:

$$d(\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r})) = d_c + Q_d d_d + Q_r d_r$$

wherein

d_c is a contribution to said distance by said continuous variables,

$Q_d d_d$ is a contribution to said distance by said discrete variables, and

$Q_r d_r$ is a contribution to said distance by said range variables.

32. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 30 wherein values of said scaling factors are set so that average distances of said one or more from variables from said corresponding one or more ideal values are equal.

33. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 32 wherein said average distance comprises utility-weighted average distances over said space of negotiation for placing more weight on better ones of the trades.

34. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 33 wherein said utility-weighted average distances are defined as

$$\langle d_r \rangle \equiv \frac{\sum_{\boldsymbol{\varkappa}} \sum_r \int_V d\mathbf{u}\ Q_r d_r \exp[-Q_r d_r - Q_d d_d - d_c]}{\sum_{\boldsymbol{\varkappa}} \sum_r \int_V d\mathbf{u}\ \exp[-Q_r d_r - Q_d d_d - d_c]} = Q_r \frac{\sum_{\boldsymbol{\varkappa}} \exp[-Q_d d_d] \sum_r d_r \exp[-Q_r d_r] \int_V d\mathbf{u}\ \exp[-d_c]}{\sum_{\boldsymbol{\varkappa}} \exp[-Q_d d_d] \sum_r \exp[-Q_r d_r] \int_V d\mathbf{u}\ \exp[-d_c]}$$

$$\langle d_d \rangle \equiv \frac{\sum_{\boldsymbol{\varkappa}} \sum_r \int_V d\mathbf{u}\ Q_d d_d \exp[-Q_r d_r - Q_d d_d - d_c]}{\sum_{\boldsymbol{\varkappa}} \sum_r \int_V d\mathbf{u}\ \exp[-Q_r d_r - Q_d d_d - d_c]} = Q_d \frac{\sum_{\boldsymbol{\varkappa}} d_d \exp[-Q_d d_d] \sum_r \exp[-Q_r d_r] \int_V d\mathbf{u}\ \exp[-d_c]}{\sum_{\boldsymbol{\varkappa}} \exp[-Q_d d_d] \sum_r \exp[-Q_r d_r] \int_V d\mathbf{u}\ \exp[-d_c]}$$

$$\langle d_c \rangle \equiv \frac{\sum_{\boldsymbol{\varkappa}} \sum_r \int_V d\mathbf{u}\ d_c \exp[-Q_r d_r - Q_d d_d - d_c]}{\sum_{\boldsymbol{\varkappa}} \sum_r \int_V d\mathbf{u}\ \exp[-Q_r d_r - Q_d d_d - d_c]} = \frac{\sum_{\boldsymbol{\varkappa}} \exp[-Q_d d_d] \sum_r \exp[-Q_r d_r] \int_V d\mathbf{u}\ d_c \exp[-d_c]}{\sum_{\boldsymbol{\varkappa}} \exp[-Q_d d_d] \sum_r \exp[-Q_r d_r] \int_V d\mathbf{u}\ \exp[-d_c]}$$

wherein

$\sum_{\boldsymbol{\varkappa}}$ indicates a repeated sum $\sum_{\varkappa_1} \cdots \sum_{\varkappa_{n_d}}$ over all possible discrete trades;

$\sum_r$ indicates a sum over all of said range variables; and

$Q_c = 1$ because Q_r is interpreted as Q_r/Q_c and Q_d is interpreted as Q_d/Q_c.

35. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 34 wherein said scaling factors Q_c, Q_d, Q_r are determined from said utility-weighted average distances.

36. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 30 further comprising one or more weights to enable the buyer to weight said contributions of said one or more variables to said utility.

37. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 36 wherein said distance function comprises at least one of the following: a weighted continuous distance, a weighted discrete distance $Z_w(\varkappa)$ and a weighted range distance.

38. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 37 wherein said weighted continuous distance is defined as:

$$\big(\mathbf{x} - \boldsymbol{\mu}(\boldsymbol{\varkappa})\big)^t \mathbf{C}_w^{-1}(\boldsymbol{\varkappa})\big(\mathbf{x} - \boldsymbol{\mu}(\boldsymbol{\varkappa})\big).$$

wherein

$\mathbf{C}_w^{-1} = \mathbf{W}_c\mathbf{C}^{-1}\mathbf{W}_c$;

W_c is a diagonal matrix formed from $\mathbf{w}_c$;

$\mathbf{w}_c$ is an n_c-vector of weight for said continuous variables; and

$\boldsymbol{\mu}$ is an n_c-vector of ideal values for said continuous variables that may depend on said discrete variables $\boldsymbol{\varkappa}$.

39. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 37 wherein said weighted discrete distance $Z_w(\varkappa)$ is defined as:

$Z_w(\boldsymbol{\varkappa}) = \sum_{i=1}^{n_d} w_{d;i}\{w_{d;i}Z_i(\varkappa_i) + \sum_{j=1(\neq i)}^{n_d} w_{d;j}Z_{i,j}(\varkappa_i, \varkappa_j)\}$

wherein

$Z_{ij}(\varkappa_i, \varkappa_j)$ is the distance if said ith discrete variable has value $\varkappa_i$ conditioned on said jth discrete variable having value $\varkappa_j$; and

$w_{d;i}$ is the ith component of a n_d vector of weights for said discrete variables.

40. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 37 wherein said weighted range distance is defined as

$R_w(\mathbf{r}) = \sum_{i=1}^{n_r} w_{r;i}R_i(r_i)$

wherein n_r is the number of said range variables,

r is an n_r-vector of tuples of preferred values of said one or more range variables,

$r_i = (\underline{r}_i, \overline{r}_i)$; and

$\overline{r}_i > \underline{r}_i$.

41. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 37 wherein said weighted distance function comprises at least one of the following: an n_c-vector of weights for said continuous variables, $\mathbf{w}_c$, an n_d-vector of weights for said discrete variables, and an n_r-vector of weights for said range variables.

42. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 41 wherein said weights are normalized so that

$$\mathbf{C}_w^{-1} = \mathbf{W}_c \mathbf{C}^{-1} \mathbf{W}_c$$

43. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 41 wherein values for said weights depend on values of said discrete variables, $\varkappa_i$.

44. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 4 further comprising a total cost of ownership function expressing a total cost of membership to the buyer that varies over the negotiation space.

45. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 44 wherein said total cost of ownership function comprises one or more cost contribution.

46. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 45 wherein said one or more cost contributions comprise one or more of the following: piece part costs, freight costs, setup costs, quality assurance costs, repair costs, and revenue generated from the trade.

47. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 44 wherein said total cost of ownership function is defined as $C_o(\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r}; \boldsymbol{\beta})$

wherein

β represents one or more other factors comprising one or more of the following: forecasted demand and current inventory levels.

48. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 47 wherein said one or more other factors are extracted from at least one of the following: an enterprise resource planning system and a supply chain management system.

49. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 48 wherein said one or more other factors are extracted in real time for enabling continuous, real time optimization.

50. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 47 wherein minimization of said cost of ownership function $C_o(\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r}; \boldsymbol{\beta})$ determines said ideal trade to the buyer: $\mathbf{x}_{\text{opt}}(\boldsymbol{\beta})$, $\boldsymbol{\varkappa}_{\text{opt}}(\boldsymbol{\beta})$, $\mathbf{r}_{\text{opt}}(\boldsymbol{\beta})$

51. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 50 wherein said at least one flexibility is determined by a Hessian matrix $\mathbf{H} = [h_{i,j}]$

wherein $h_{i,j}$ is defined as

$$h_{i,j} = \left. \frac{\partial^2 C_o(\mathbf{x}, \boldsymbol{\varkappa}, \mathbf{r}; \boldsymbol{\beta})}{\partial x_i \partial x_j} \right|_{\mathbf{x}=\mathbf{x}_{\text{opt}}(\boldsymbol{\beta}), \boldsymbol{\varkappa}=\boldsymbol{\varkappa}_{\text{opt}}(\boldsymbol{\beta}), \mathbf{r}=\mathbf{r}_{\text{opt}}(\boldsymbol{\beta})}$$

52. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 3 wherein said one or more capabilities comprise one or more of the following: price discounts on large volume orders, and variation in delivery as a function of price.

53. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 8 wherein said one or more capabilities specify one or more of the following:

one or more continuous capabilities, one or more discrete capabilities, and allowed values for said range variables.

54. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 53 wherein said allowed values for said ranges variables contribute to said distance function.

55. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 53 wherein said allowed values for said range variables comprise one or more pairs $(\underline{r}_j, \overline{r}_j)$ wherein $\underline{r}_j$ is a lower bound for the jth one of said range variable and $\overline{r}_j$ is an upper bound for the jth one of said range variable.

56. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 52 wherein said continuous capabilities are one or more responses from said suppliers to a request for the buyer.

57. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 56 further comprising a vector-valued function $\mathbf{f}(\mathbf{x}^{(b)}, \mathbf{x}^{(s)}, \boldsymbol{\varkappa})$ to determine said one or more supplier responses wherein

$\mathbf{x}^{(b)}$ is said buyer request and

$\mathbf{x}^{(s)}$ is at least a previous one of said supplier responses.

58. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 57 wherein said vector-valued function $\mathbf{f}(\mathbf{x}^{(b)}, \mathbf{x}^{(s)}, \boldsymbol{\varkappa})$ comprises one or more components f_i for corresponding ones of said continuous variables:

$x_i^{(s)} = f_i(\mathbf{x}^{(b)}, \mathbf{x}^{(s)})$

59. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 52 wherein said one or more components, f_i are piecewise linear functions.

60. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 59 wherein said one or more components, f_i are specified with one or more breakpoints.

61. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 53 wherein said one or more discrete capabilities of said suppliers comprise one or more constraints from said suppliers on said one or more discrete variables.

62. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 3 wherein said one or more capabilities are represented by one or more piecewise linear functions.

63. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 4 further comprising one or more constraints involving said one or more variables which must be satisfied for the buyer and at least one of the sellers to trade.

64. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 63 wherein said one or more constraints comprise one or more of the following: discrete constraints for expressing one or more allowed and/or disallowed combinations of values for said discrete variables $\varkappa$ and continuous constraints for setting one or more requirements on said continuous variable $\mathbf{x}$.

65. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 64 wherein said continuous constraints from the buyer are linear.

66. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 64 wherein said continuous constraints comprise at least one of inequality constraints and equality constraints.

67. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 64 wherein said continuous constraints depend on values of said discrete variables, $\varkappa$.

68. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 63 wherein said one or more constraints comprise one or more of the following:

required delivery time, and an unacceptable color.

69. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 64 wherein at least one of said continuous constraints depend on values of at least one of said discrete variables $\varkappa$.

70. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 3 wherein said determining at least one of the trades that is optimal step comprises the steps of:

selecting one of said suppliers;

determining at least one of the trades that corresponds to a maximum value of said utility of the buyer and that is within the capabilities of said selected supplier.

71. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 70 wherein said determining at least one of the trades that is optimal step further comprises the steps of:

selecting another of said suppliers; and

repeating said determining at least one of the trades step for said another selected supplier.

72. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 71 wherein said determining at least one of the trades that is optimal step further comprises the steps of:

choosing at least of the suppliers having the highest said maximum value of said utility of the buyer.

73. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 72 further comprising a subsystem to perform said determined trade between the buyer and the chosen supplier.

74. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 3 further comprising a subsystem to perform said determined trade.

75. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 3 wherein said utility comprises at least one of the following: quantitative factors and qualitative factors.

76. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 4 wherein said determining at least one of the trades that is optimal step further comprises the step of:

minimizing a distance from said ideal trade.

77. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 76 wherein said distance comprises one or more of the following: a continuous component, a discrete component, and a range component.

78. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 77 wherein said minimizing a distance from said ideal trade step comprises the steps of:

determining values of said continuous variables that minimize said distance for one or more settings of said discrete variables.

79. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 78 further comprising the steps of:

representing said distance by a function of said discrete variables; and

determining an optimal one of said settings of said discrete variables by minimizing said function of said discrete variables.

80. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 78 wherein said determining values for said continuous variable step is performed under one or more constraints on said continuous variables.

81. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 79 wherein said representing said determining an optimal one of said settings of said discrete variables step is performed under one or more constraints on said discrete variables.

82. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 4 further comprising means for aggregating at least one of the suppliers to participate in said trade with the buyer.

83. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 82 wherein said aggregating means perform the steps of:

determining one or more subsets of said suppliers that satisfy one or more constraints on said discrete variables.

84. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 83 wherein said one or more discrete variable constraints comprise at least one of the following: buyer discrete variable constraints and seller discrete variable constraints.

85. (New) A system for determining one or more trades between a buyer and one or more suppliers as in claim 83 further comprising the step of optimizing over said continuous variables to determine an optimal one of said subset of buyers.

86. (New) A grammar for a system that determines one or more trades between a buyer and one or more suppliers comprising:

(a) one or more capability rules representing one or more capabilities of said suppliers to trade with the buyer;

(b) one or more preference rules representing one or more preferences of the buyer; and

(c) one or more match rules representing matches between said one or more capabilities and said one or more preferences.

87. (New) A grammar for a system that determines one or more trades as in claim 86 wherein said one or more capabilities of said suppliers are specific to particular ones of said buyers.

88. (New) A grammar for a system that determines one or more trades as in claim 86 wherein said capability rules comprise one or more of the following:

(a) a discrete variable rule for representing a description of a discrete variable;

(b) a continuous variable rule for representing a description of a continuous variable; and

(c) a range variable rule for representing a description of a range variable.

89. (New) A grammar for a system that determines one or more trades as in claim 88 wherein said description of the continuous variable comprises at least one of a minimum value and a maximum value for the continuous variable.

90. (New) A grammar for a system that determines one or more trades as in claim 88 wherein said one or more capability rules comprise one or more constraint rules representing constraints on value of at least one of said discrete variables, and said continuous variables.

91. (New) A grammar for a system that determines one or more trades as in claim 89 wherein said one or more constraint rules comprise at least one matrix for representing said constraints.

92. (New) A grammar for a system that determines one or more trades as in claim 90 wherein said constraints on said values of said discrete variables comprise one or more permitted value continuations for the discrete variables.

93. (New) A grammar for a system that determines one or more trades as in claim 88 wherein said range variable description comprises at least one of a minimum value and a maximum value for the range variable.

94. (New) A grammar for a system that determines one or more trades as in claim 90 wherein said constraints on said values of said continuous variables comprise one or more of the following: an inequality, an equality, a linear constraint, and a non-linear constraint.

95. (New) A grammar for a system that determines one or more trades as in claim 86 wherein said one or more capability rules further comprise an aggregation flag indicating a willingness of the supplier to participate in an aggregation for the buyer.

96. (New) A grammar for a system that determines one or more trades as in claim 86 wherein said preferences of the buyer are specific to at least one of said suppliers.

97. (New) A grammar for a system that determines one or more trades as in claim 86 wherein said preference rules comprise one or more of the following:

(a) a continuous variable rule for representing a description of a continuous variable;

(b) a discrete variable rule for representing a description of a discrete variable, and

(c) a range variable rule for representing a description of a range variable.

98. (New) A grammar for a system that determines one or more trades as in claim 97 wherein said preference rules further comprise one or more weights for representing an importance of at least one of said discrete variable, said continuous variable and said range variable.

99. (New) A grammar for a system that determines one or more trades as in claim 97 wherein said preference rules comprise at least one of the following:

(a) a first field representing an ideal value for said range variable;

(b) a second field representing an ideal value for said continuous variable; and

(c) a matrix representing one or more tradeoffs of said continuous variables.

100. (New) A grammar for a system that determines one or more trades as in claim 97 wherein said preference rules comprise a matrix representing one or more tradeoffs of said discrete variables.

101. (New) A grammar for a system that determines one or more trades as in claim 97 further comprising at least one aggregation rule comprising at least one of the following:

(a) a list of one or more of said suppliers that can participate in the one or more trades with the buyer;

(b) one or more contribution type fields for specifying contribution types of said or more continuous variables; and

(c) one or more constraints around the aggregation.

102. (New) A grammar for a system that determines one or more trades as in claim 101 wherein said contribution types comprise at least of the following: sum, average and zero.

103. (New) A grammar for a system that determines one or more trades as in claim 101 wherein said constraints around the aggregation comprise requiring that all orders arrive on the same day.

104. (New) A grammar for a system that determines one or more trades as in claim 99 wherein said one or more preferences rules further comprise:

(a) at least one mask for allowing at least one of said ideal value for said range variable, said continuous variable, and said one or more tradeoffs of said continuous variables to be dependent on values of said discrete variables.

105. (New) A grammar for a system that determines one or more trades as in claim 88 wherein said one or more match rules comprise at least one of the following:

(a) a single supplier match rule describing at least one optimal one of said one or more trades with a single one of the suppliers; and

(b) an aggregate supplier match rule describing at least one optimal one of said one or more trades with an aggregation of said suppliers;

106. (New) A grammar for a system that determines one or more trades as in claim 105 wherein said single supplier match rule comprises at least one of the following:

(a) an identifier for indicating said supplier of said trade;

(b) a utility for indicating a utility of said trade;

(c) a feasibility flag for indicating whether a feasible one of the trades with said single supplier was found;

(d) a continuous variable field indicating a value for said continuous variable;

(e) a discrete variable field indicating a value for said discrete variable;

(f) a range variable field indicating a value for said range variable; and

(g) a cost factors field indicating constituent costs contributing to a total cost of ownership at said trade.

107. (New) A grammar for a system that determines one or more trades as in claim 104 wherein said aggregate supplier match rule comprises at least one of the following:

(a) a utility field indicating a utility of said trade;

(b) a feasibility field indicating whether a feasible one of said trades with the aggregation of suppliers was found;

(c) a cost factors field indicating constituent costs contributing to a total cost of ownership at said trade; and

(d) a list of one or more trade parameters for said suppliers in the aggregation.

108. (New) A grammar for a system as in claim 107 wherein said list of trade parameters comprise at least one of the following:

(a) an identifier for identifying one of said suppliers in the aggregation;

(b) a continuous variable field indicating a value for said continuous variable;

(c) a discrete variable field indicating a value for said discrete variable;

(d) a range variable field indicating a value for said range variable.

109. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers comprising the steps of:

(a) specifying one or more initial preferences by said one or more buyers;

(b) responding to said one or more initial preferences by said one or more sellers with one or more offers; and

(c) revising said one or more initial preferences based on said one or more offers by said one or more buyers to specify one or more revised preferences.

110. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 109 further comprising the steps of:

(a) responding to said one or more revised preferences by said one or more sellers with one or more revised offers; and

(b) revising said one or more revised preferences based on said one or more revised offers by said one or more buyers.

111. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 110 further comprising the steps of iteratively repeating said responding to said one or more revised preferences step and said revising said one or more revised preferences step to implicitly determine said one or more preferences by said one or more buyers.

112. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 109 wherein said one or more initial preferences and/or said one or more revised preferences comprise one or more dimensions.

113. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 112 wherein said one or more initial preferences and/or said one or more revised preferences comprise one or more weights corresponding to said one or more dimensions wherein each of said weights specifies an importance of said corresponding dimension to the one or more buyers.

114. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 109 wherein said one or more initial preferences and/or said one or more revised preferences comprise one or more constraints.

115. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 114 further comprising the step of:

(a) filtering said one or more offers from the one or more sellers to pass only those of said one or more offers that satisfy said one or more constraints

116. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 112 further comprising the step of:

(a) sorting said one or offers at the one or more buyers based on at least one of said dimensions.

117. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 112 further comprising the steps of:

(a) computing a distance between said one or more initial preferences and said one or more offers.

118. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 117 further comprising the steps of:

(a) sorting said one or more offers at the one or more buyers based on said distance.

119. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 112 further comprising the steps of:

(a) computing a distance function between said one or more revised preferences and said one or more offers.

120. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 119 further comprising the steps of sorting said one or more offers at the one or more buyers based on said distance.

121. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 117 wherein said distance is defined as

$$d(\mathcal{C}_{rev}, \mathcal{C}_{\alpha}) = \frac{\sum_{i=1}^{D} a_i w_i d_i(\mathcal{C}_{rev}, \mathcal{C}_{\alpha})}{\sum_{i=1}^{D} a_i} \tag{14}$$

wherein

$\mathcal{C}_{rev}$ is said revised preference;

$\mathcal{C}_{\alpha}$ is said one or more offers;

D is the number of said dimensions;

i is an index of said dimensions;

a_i is a binary variable indicating which of said dimensions are used;

w_i is one of said weights corresponding to said ith dimension; and

$d(\mathcal{C}_{rev}, \mathcal{C}_{\alpha})$ is a component of said distance for said ith dimension.

122. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 120 wherein said ith component of said distance comprises at least one of a similarity component and a brand name component.

123. (New) A method for determining at least one preference by one or more buyers for one or more goods and/or services from one or more sellers as in claim 122 wherein said similarity component is assymetric.

124. (New) A method for supplying one or more goods and/or services by one or more suppliers in fulfillment of one or more orders comprising the steps of:

(a) determining one or more components of the goods and/or services that are needed for the fulfillment of said one or more orders of a first one of said suppliers

(b) determining one or more constraints on the fulfillment of said one or more orders;

(c) sending one or more requests for said one or more components to at least one other of said one or more suppliers; and

(d) determining one or more combinations of one or more responses to said one or more requests for said one or more components, that satisfy one or more contraints.

125. A method for supplying one or more goods and/or services as in claim 124 wherein said determining one or more components of the goods and/or services step comprises the step of determining those of said one or more components that are not present at said first supplier by examining a state of said first supplier.

126. (New) The method of supplying one or more goods and/or services as in claim 125 wherein said state of said first supplier comprises one or more of the following: an inventory of said one or more components of said first supplier and one or more references to unwanted ones of said suppliers.

127. (New) The method of supplying one or more goods and/or services as in claim 124 wherein said constraints comprise one or more of the following: one or more logical constraints and one or more numerical constraints.

128. (New) A method for supplying one or more goods and/or services as in claim 127 wherein said logical constraints are expressed in at least one of linear logic and Boolean logic.

129. (New) A method for supplying one or more goods and/or services as in claim 127 wherein said logical constraints comprise a logical AND of two or more events in two or more markets.

130. (New) A method for supplying one or more goods and/or services as in claim 129 wherein said two or more events comprise an order for at least one of said components and transportation of said at least one component.

131. (New) The method for supplying one or more goods and/or services as in claim 127 wherein said numerical constraints comprise an ordering of two or more events in two or more markets.

132. (New) The method for supplying one or more goods and/or services as in claim 131 wherein said two or more events comprise a completion of at least one of said components and an available pick-up time for transportation of said at least one component.

133. (New) The method for supplying one or more goods and/or services as in claim 127 wherein said numerical constraints comprise at least one requirement that a total expenditure on said components is less than a threshold.

134. (New) The method for supplying one or more goods and/or services as in claim 124 further comprising the step of:

(a) ranking said one or more combinations that satisfy said one or more constraints according to one or more criteria.

135. (New) The method for supplying one or more goods and/or services as in claim 134 wherein said criteria comprise a reliability of said one or more suppliers.

136. (New) The method for supplying one or more goods and/or services as in claim 124 wherein said one or more requests for said one or more components comprise a time-out period.

137. (New) The method for supplying one or more goods and/or services as in claim 136 further comprising the step of:

(a) filtering those of said responses that arrive after said time-out period.

138. (New) The method for supplying one or more goods and/or services as in claim 124 wherein said suppliers operate in one or more markets.

139. (New) The method for supplying one or more goods and/or services as in claim 138 wherein said one or more requests comprise a first identifier and a second identifier wherein said second identifier identifies said market of said first supplier.

140. (New) The method for supplying one or more goods and/or services as in claim 139 further comprising the step of forecasting demand at said one or more suppliers.

141. (New) The method for supplying one or more goods and/or services as in claim 140 wherein said forecasting demand step comprises the step of:

(a) counting those of said requests having different ones of said first identifier and said second identifier for avoiding spurious amplication of the demand.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Art Unit: 2164
Macready et al.	Examiner: To be assigned
Serial No. 09/729,692 Filed: December 6, 2000	Attorney Docket: 9392-040-999
For: Method and System for Discovery of Trades Between Parties	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

IN THE SPECIFICATION:

Marked up versions of all revised paragraphs, showing insertions and deletions, are included in Appendix A.

Replace the first paragraph of page 1 with the following text:

This application claims priority to provisional application no. 60/168,754 filed on December 6, 1999, titled, "An E-Commerce Infrastructure for Value Chains", the contents of which are herein incorporated by reference. This application also claims priority to provisional application no. 60/194,880, titled, "Method and System to Mediate Commerce", filed on April 6, 2000, the contents of which are herein incorporated by reference.

REMARKS

This amendment adds a claim of priority to provisional application no. 60/194,880, titled, "Method and System to Mediate Commerce", filed on April 6, 2000.

No fee is believed to be due for this preliminary amendment. Should any fees be required however, please charge such fees to Pennie & Edmonds LLP deposit account no. 16-1150.

Respectfully submitted,

Date: April 6, 2001

Gregory J. Gonsalves, Reg. No. 43,639
For: Francis E. Morris, Reg. No. 24,615

PENNIE & EDMONDS LLP
1667 K Street, N.W.
Washington, D.C. 20006

(202) 496-4400

Appendix A

Changes to the Specification

The first paragraph at page 1 is revised as follows:

This application claims priority to provisional application no. 60/168,754 filed on December 6, 1999, titled, "An E-Commerce Infrastructure for Value Chains", the contents of which are herein incorporated by reference. This application also claims priority to provisional application no. 60/194,880, titled, "Method and System to Mediate Commerce", filed on April 6, 2000, the contents of which are herein incorporated by reference.